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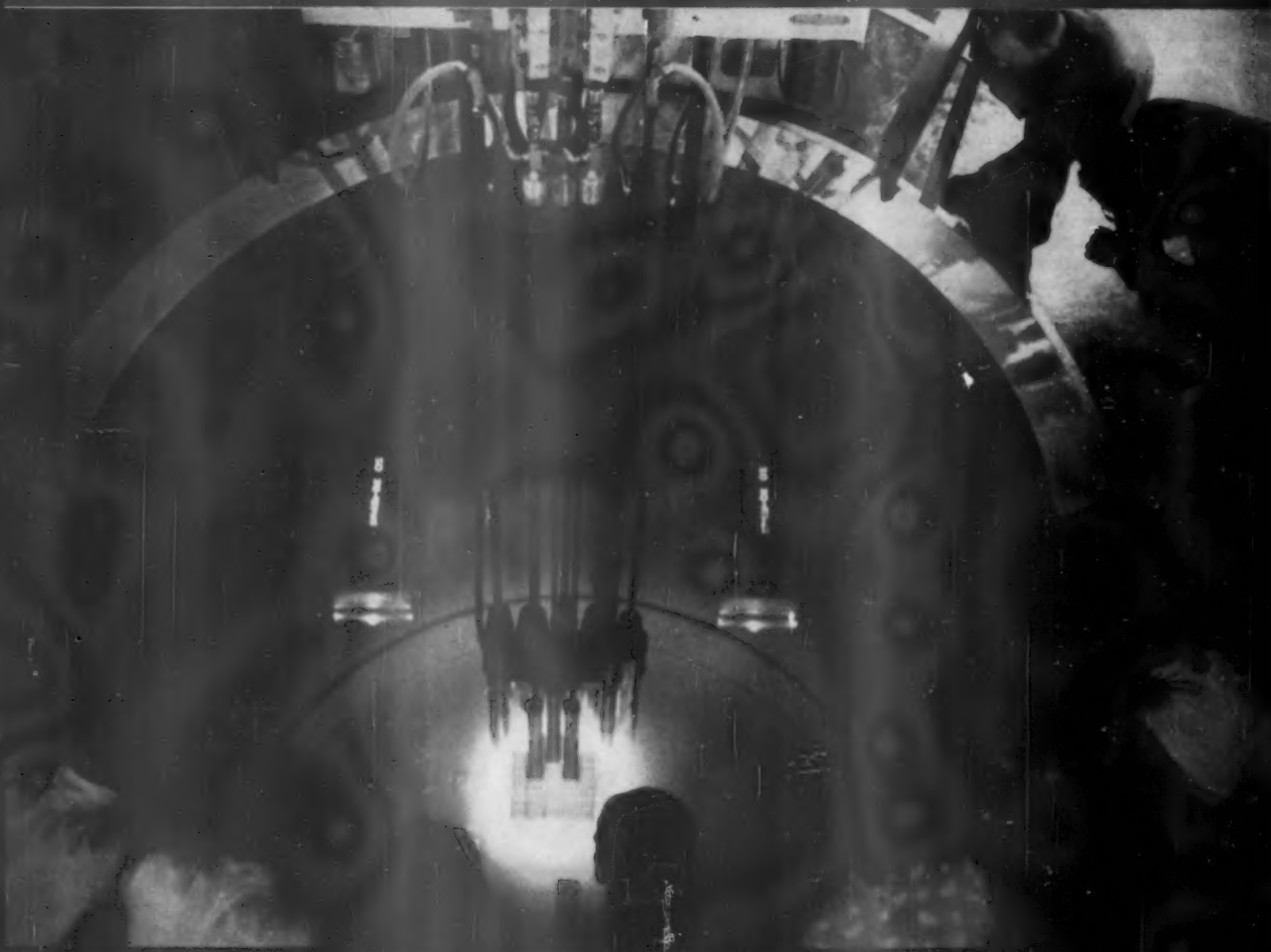
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August 20, 1955

Vol. 12, No. 9 PAGES 113-129

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Reactor in Operation

See Page 113

A SCIENCE SERVICE PUBLICATION

AGRICULTURE

New Species From Old

Using the atom for creation not destruction, plant types that fit the definition "new species" have been created by Swedish scientists. Sprouting controlled by radiation.

By WATSON and HELEN DAVIS

► MAN MAY have already created new plant species out of old, using as a tool for creation his most destructive force, the atom.

More food for a hungry world is the first prospect from this atom-created beneficial mutation, reported to the International Conference on the Peaceful Uses of Atomic Energy in Geneva.

The Swedish scientists L. Ehrenberg, I. Granhall and A. Gustafsson reported plant types that fit the definition of "new species" have been made by atomic bombardment of plants in an experimental garden.

"In one stroke and simultaneously," irradiation from atomic particles changed the hereditary make-up of the plants so much that their offspring showed all the essential characters of a separate species, they said.

Features marking the plants as "new species" are inability to cross-fertilize with their parent stock, drastic changes in shape and structure, altered response to environment, and differences in genetic structure that can be detected under the microscope.

The "invention" of new species comes as part of a world-wide search for new varieties of agricultural plants to feed the hungry mouths of tomorrow, by inducing desirable hereditary mutations with atomic particle bombardment.

From experimental work in Sweden, it has definitely been shown in barley and other test plants that such induced mutations can increase the yield per acre of a variety, or leave the yield unchanged while improving special characteristics of importance in agriculture.

In addition to increased yields, beneficial mutations concerning stiffness of straw, response to fertilization, earliness of fruiting, protein or oil content, fiber strength and grain size all were obtained.

Most agricultural species, even high-bred ones like barley, wheat and corn, are still "rather old-fashioned" in their characteristics, the scientists said, and need to be reconstructed according to the demands of modern agriculture. They believe that irradiation-induced mutations may offer the way to get these changes.

In the past, breeders had to wait patiently for mutations to occur naturally, selecting the occasional variants for breeding experiments in the hope of getting improved varieties. With irradiation exposure, the mutation rate can be raised several thousand times above the natural rate.

This makes it possible to observe and experiment with a greater number of bene-

ficial mutations, and in a much shorter time than has ever been possible before.

At present there is no way of telling what kind of a mutation may result from irradiation exposure, and breeders must still wait for their exposed seeds to sprout to see what changes have occurred. Experiments are now being conducted, the Swedish scientists said, to learn how to influence mutations on a selective basis by varying the kind and amount of irradiation.

Sprouting Inhibited

► VEGETABLE CROPS will probably be exposed to atomic radiation on a commercial scale "within the next few years," to improve storage quality and destroy plant pests, a team of U. S. scientists told the conference.

Describing the startling new jobs scientists are finding for atomic radiation in the world's race for more and better food, Drs. A. H. Sparrow of the Brookhaven National Laboratory and J. E. Gunckel of Rutgers University, the State University of New Jersey, said that radiation has already been used successfully to control sprouting in stored potatoes and onions.

"There is every reason to believe that the same technique will prove useful in the inhibition of sprouting of other vegetables," they said.

The scientists also revealed that tests at the Brookhaven Laboratory indicate strong radiation doses may prevent reproduction of the golden nematode, a destructive pest of potatoes.

Super Cabbage Plants

► SUPER CABBAGE PLANTS, bigger and better than the kind that nature grows now, will be possible when scientists find a way of using sunlight's energy in a less complex and more efficient way than plants do.

Dr. Arthur H. Snell of the Oak Ridge National Laboratory in Tennessee, no doubt using cabbage symbolically for all of mankind's food and energy, said, "Maybe the average cabbage plant is not making the best use of its daylight hours, and when we have fuller knowledge and more perspective about photosynthesis and related processes, we can show the cabbage plant how it can grow into a super cabbage plant."

Science News Letter, August 20, 1955

Urea has the highest nitrogen content of all solid fertilizers.

• RADIO

Saturday, August 27, 1955, 5:00-5:15 p.m. EDT
"Adventures in Science" with Watson Davis, Director of Science Service, over the CBS Radio Network. Check your local CBS Station.

Dr. E. F. Knipling, chief of the entomology research branch, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md., will discuss "The War on Insects."

BIOPHYSICS

Soaking Protects From Radiation Damage

► A SIMPLE SOAKING in water offers protection to living tissues against radiation injuries, an American scientist reports in *Nature* (Aug. 13).

To test the effects of increased moisture on X-ray damage, Richard S. Caldecott of the U. S. Department of Agriculture and the University of Minnesota soaked barley seeds in plain water for different lengths of time, then exposed them to X-rays.

He found that soaking seeds for one hour at room temperature, 71.6 degrees Fahrenheit, or for four hours at 32 degrees Fahrenheit, increases the seeds' resistance to X-ray damage. Soaking them for longer periods appeared to reduce this high resistance until the same effect as with dry seeds was obtained by X-ray radiation.

These findings conflict with the current belief that much radiation damage is caused "indirectly" by the decomposition of moisture in living tissue by the X-rays, Mr. Caldecott pointed out. Far from increasing the damage, stepped-up moisture content actually affords protection from X-rays.

Science News Letter, August 20, 1955

PUBLIC HEALTH

Atomic Self-Protection Will Come Naturally

► OUR CHILDREN or grandchildren, growing up in the atomic age, will know well how to protect themselves from the radiation hazards of their daily lives.

They will follow precautions as a matter of habit, because they will have been educated in such matters as the present generation of adults was educated to watch out for trains at railroad crossings.

This picture of increasing future safety from radiation accompanied by increasing production and use of radioactive materials was presented by Sir Ernest Rock Carling, London, England, at the International Conference on the Peaceful Uses of Atomic Energy in Geneva.

Those who work in atomic energy plants and other places using radioactive materials, such as hospitals, must of course learn the "techniques and discipline" necessary to avoid exposure, Sir Ernest said.

The general population also, he suggested, may need to learn the lessons of self-protection. "Inevitably," he said, populations will be exposed to higher peacetime backgrounds of radiation.

Science News Letter, August 20, 1955

GENERAL SCIENCE

Predict Harnessing H-Bomb

U.S., British and Russian scientists are seeking way to get energy from controlled fusion, which India's representative at Geneva predicted will be accomplished within 20 years.

See Front Cover

By WATSON and HELEN DAVIS

►MINING the world's oceans for heavy hydrogen, a virtually inexhaustible power supply, was foreseen by scientists in Geneva, following the prediction by Dr. Homi J. Bhabha that energy may be obtained within 20 years from controlled fusion of the light elements.

Dr. Bhabha, chairman of India's Atomic Energy Commission, is president of the International Conference on Peaceful Uses of Atomic Energy.

When such an authority as Dr. Bhabha is confident that H-bomb reactions can be harnessed, oceans may be tapped for their heavy hydrogen, or deuterium, even sooner than within two decades.

Other elements besides hydrogen, for instance lithium, can be fused with release of energy, although Dr. Bhabha did not hint at this in his presidential address opening the Geneva Conference.

It is known that lithium stocks are already speculative on stock exchanges around the world.

The raw materials for fusion are plentiful compared with the scarce and heavy uranium and thorium out of which fissionable materials, for bombs or power reactors, are made.

Within a few days after Dr. Bhabha's prediction, the heads of atomic programs in Both United States and Britain revealed that scientists in their countries were working on peaceful uses of the fusion reaction.

Adm. Lewis L. Strauss, chairman of the U. S. Atomic Energy Commission, said that the U. S. is engaged in a moderate program of very long-range research to develop power from thermo-nuclear fusion. This program does not jeopardize progress in the fission reactor field, he said.

When asked by SCIENCE SERVICE whether lithium figures in thermonuclear reactions, Adm. Strauss refused to answer.

Sir John Cockcroft, director of Britain's Atomic Energy Research Establishment at Harwell, disclosed that British scientists were also working on the problem of harnessing fusion reactions.

It is presumed the Russians are likewise tackling the task of thermonuclear control. Thus, the three leaders in the atomic field are evidently also vying for first position in making the energy released by fusion available for productive use.

Dr. Bhabha's announcement confirmed speculation over several years on the possibility of triggering the hydrogen reac-

tion without exploding an atomic, or fission, bomb.

Originally it was thought the extremely high heat of a uranium or plutonium bomb was necessary to ignite the fusion bomb. Now it is believed some other devices, such as wires exploded by a jolt of high-voltage electricity or sun-like temperatures produced by shock waves, might do the trick. (See SNL, July 30, p. 76, and Aug. 6, p. 84).

Produce Atomic Fuel

► AN ATOMIC POWER REACTOR will make money on the atomic fuel it produces in generating power, engineers from the Oak Ridge National Laboratory told the conference.

The U. S.-designed power plant, now in experimental form, uses a fluid fuel, consisting of uranyl sulfate in heavy water, and also thorium oxide slurry in heavy water in another part of the device, called a homogenous reactor.

Neutrons from fissioning uranium change the thorium into uranium isotope 233, the

atomic fuel. Due to thorium's low relative cost, the atomic materials produced is worth more than the uranium put into the plant.

The fuel cost for operating a large power plant of this sort would be low provided the cost of separating spent materials from produced fissionable materials is cheap. If this could be done wholesale from five or more 100,000 kilowatt plants, fuel processing should be less than one-tenth cent per kilowatt hour, R. B. Briggs and J. A. Swartout estimated.

A major attraction at the Geneva Atoms-for-Peace conference is a "swimming pool" reactor, designed primarily for research purposes. The exhibit reactor, which is shown in the photograph on the cover of this week's SCIENCE NEWS LETTER, can operate at a continuous power level of 10 kilowatts. Radiation from the core appears as a bluish-green glow.

"Runaway" Reactor

► FEAR of the consequences if a "runaway" atomic power plant should blow up in a densely inhabited area was reduced when Dr. J. R. Dietrich of Chicago's Argonne National Laboratory told the conference the results of such an explosion, which was allowed to happen at Los Alamos in 1953.



"RUNAWAY" REACTOR—This photograph, made by a high-speed camera at the height of the explosion of the "Supo" reactor, shows the large amount of debris blown into the air. Most of the fuel element fragments fell to earth within 200 feet of the reactor. There was no dangerous fall-out at distances greater than a few hundred feet.

Within a radius of 350 feet from the site of the explosion, chunks of melted and twisted metal were found afterwards. These added up to the amount of metallic fuel plus the thin-walled steel tank that contained it.

"No large fraction of the reactor core material left the site in the form of airborne material," the Argonne Laboratory scientist stated.

Although X-ray type radiation momentarily surged out from the exploding reactor in such quantity that it registered 400 milliroentgens per hour on a recording instrument half a mile away, the total amount of radiation received at the measuring point was less than one-fortieth that figure. A milliroentgen is one-thousandth the unit of quantity of X-rays.

Although duration of exposure to these rays is measured in roentgens per hour, the ray's effects on the body add up. Total radiation of from 400 to 600 roentgens is within the limits likely to cause death. Thus the peak dosage of the explosion, at the distance of half a mile, measured only one-thousandth of the lethal dose.

Blowing up of the "Supo" reactor at Los Alamos in 1953 came as the climax of a series of tests designed to learn more about what happens when an atomic power plant runs too hot.

After the fuel elements had become warped and partly melted at the end of the series, it was decided to arrange conditions so that heat would build up as rapidly as possible, with all controls removed. This would simulate the worst conditions in the case of a runaway reactor.

The resulting explosion sounded to scientists at the control station, half a mile away, like that of one to two pounds of 40% dynamite exploding at the same distance, it was reported. The blow-up was reported to have effects "comparable to those which could be caused by a moderate amount of chemical explosive."

Einstein and Fermi

► THE NAMES of two great scientists who died within the past year, Albert Einstein and Enrico Fermi, have been immortalized by christening chemical elements 99 einsteinium and 100 fermium.

Dr. Albert Ghiorso of the University of California at Berkeley revealed both elements were first discovered in debris from the October, 1952, H-bomb explosion by Dr. Glenn Seaborg, also of the University of California.

A group of scientists led by Dr. Seaborg later made einsteinium and fermium in a cyclotron and in nuclear reactors at Berkeley, Argonne National Laboratory and Los Alamos.

The symbol for element 99, einsteinium, is plain E. That for 100 is Fm.

Now all discovered elements are named, since 101 was previously named mendelevium after the Russian, D. Mendeleeff, who announced the periodic system of the elements in 1869. This name pleased the

Russians who placed it on the giant periodic table of the USSR exhibit at the International Conference on the Peaceful Uses of Atomic Energy in Geneva.

The Russians are expected to replace their labels for 99, athenium, and for 100, centurium, with the announced U. S. names.

Naming the new elements was delayed by secrecy imposed by the creation in the thermonuclear reaction when uranium 238 added 17 neutrons in one jump, becoming einsteinium 255, which changed to fermium 255 by electron loss.

The elements were found in H-bomb dust picked up about 200 miles from Eniwetok.

Subsequently both 99 and 100 have been made in the cyclotron by bombardment with nitrogen 14, and in a reactor by successive neutron irradiation of plutonium.

Dr. Ghiorso predicted sufficient quantities of element 99 to be visible microscopically would be available within a year, since one form has a half life of one year. Within four years, the discovery of elements 102, 103, and 104 will probably be made as a result of bombardment of heavy elements with heavy particles. Dr. Ghiorso reported atoms with 152 or more neutrons change themselves spontaneously at a terrifically enhanced rate, as fermium does.

The christening announcement will be made formally in the *Physical Review*, dated Aug. 1, which will appear Sept. 1.

Predict Heavy Atoms

► ATOMIC HEARTS twice as heavy as any now known can be made by "fattening" lighter elements with neutrons, Dr. John A. Wheeler of Princeton University, Princeton, N. J., predicted at the conference. "Massive" doses of neutrons would be needed to make the "superheavy" nuclei, which would be the heaviest form of matter on earth. Such atomic hearts would be unstable and break up into smaller fragments, but would live long enough to be studied in the laboratory.

Nuclear reactors are presently the best source of neutrons in quantity.

The heaviest nucleus known is element No. 101 in the series counted by atomic number. It has an atomic mass of 256. An element's atomic number is equal to the total number of positive charges on the nucleus, from one for hydrogen to 101 for element 101. An element's mass is considered concentrated in the nucleus, made up of protons and neutrons, collectively called nucleons.

Dr. Wheeler based his suggestion of "nuclei with masses two or more times heavier than the heaviest nucleus now known" on estimated limits of nuclear stability. That is the limit to the number of neutrons a nucleus may contain without becoming unstable. This limit varies for different elements.

Certain elements, such as uranium and plutonium of atomic bomb fame, split into two fragments of nearly equal mass after absorbing bombarding neutrons. This is nuclear fission.

In outlining what is known about the

physics of fission, Dr. Wheeler pointed out that the Russians Flerov and Petriak were the first to discover the spontaneous fission of uranium in 1940. It was, he said, "one more reminder of the international character of fission physics, as of every other branch of science."

To get some idea of what goes on inside the nucleus, physicists have made simplified pictures of atomic cores, then tried to make predictions based on these models. One likens the nucleus to an "onion," another likens it to a "water drop."

"An improved analysis," Dr. Wheeler said, "combines the two points of view."

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AGRICULTURE

Radioactive Antibodies

Fighting cancer with radioactive antibodies reported one step closer. Other radiomedicines show promising results in treatment of glandular cancers and lung cancer.

By WATSON and HELEN DAVIS

► **FIGHTING CANCER** with radioactive antibodies seems a step nearer as a result of studies reported by Drs. W. F. Bale and I. L. Spar of the University of Rochester, N. Y., at the International Conference on the Peaceful Uses of Atomic Energy in Geneva.

The antibodies would not fight cancer directly in the way that polio antibodies, for example, fight crippling infantile paralysis. Instead they would serve to carry cancer-killing radioactivity to cancers located deep within various body organs.

These radioactive cancer-fighting antibodies may not even be antibodies in the strict sense. Antibodies are substances formed in the body to fight off foreign material, such as invading disease germs.

Antibodies also develop against foreign tissues, and attempts have been made in the past to develop antibodies to cancers with the idea that such antibodies, with radioactive iodine attached to them, would be carried directly to the cancer after injection into the body. So far, however, these studies have not reached the stage of application to human cancers.

The Rochester scientists were able to immunize rabbits against rat kidney tissue, so that the rabbits developed antibodies to rat kidney. Material from kidneys of these rabbits and from normal rabbits was labeled with radioactive iodine. This material, when injected into the veins of rats and rabbits, localized preferentially in the kidneys of the rats and rabbits.

When prepared in one way, over 10% of the radioactive iodine from the preparation was found in the kidneys of recipient rabbits three days after injection. The radioactive iodine-labeled kidney material from immunized rabbits localized in the small intestine as well as kidneys of rats.

The studies were made with assistance of R. Moore, D. E. Wolfe and R. L. Goodland, also of the University of Rochester.

Radiodrugs for Tumors

► **PROMISING RESULTS** with use of radioactive chemicals in treatment of certain cancerous conditions of lymph nodes, popularly called glands, were reported for the first time by Dr. John H. Lawrence of the University of California, Berkeley, Calif.

The conditions are Hodgkin's disease and lymphoblastoma.

Radioactive phosphorus is "probably the treatment of choice," for selected cases of giant follicle lymphoblastoma, Dr. Lawrence told the conference.

About 10 out of 30 patients with the other ailment, Hodgkin's disease, have responded favorably to the radioactive phosphorus. Two are still living more than 15 and 20 years after the start of the treatment. Both had the advantage of diagnosis and treatment early in the course of the disease and both had X-ray treatment as well as the radioactive phosphorus.

Reported also for the first time is Dr. Lawrence's medical use of colloids of radioactive chromic phosphate and radioactive yttrium.

These colloids can be made so that the particles of radioactive material in suspension are of different sizes. When injected into a vein, they are picked up by scavenger cells of the body, known as phagocytes, and carried to certain organs in the body where they localize and give off radioactivity. The large particle colloids localize in liver and

spleen and the intermediate sized ones in the bone marrow primarily in rats, rabbits and mice.

Results from these in treating leukemia and in a condition of too many red blood cells, polycythemia vera, were no better than with radioactive phosphorus except in the unusual case, Dr. Lawrence reported.

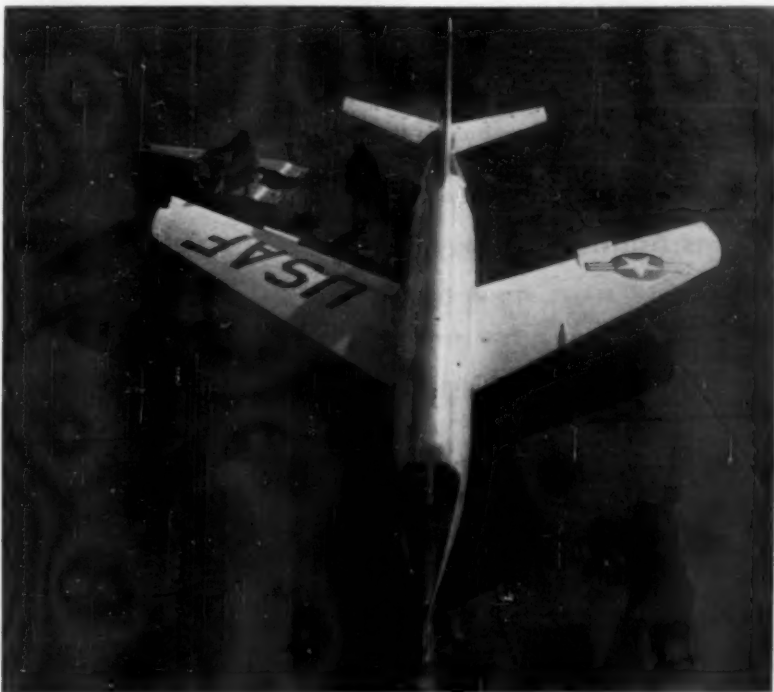
Radiogold for Cancer

► **A BETTER** attack on lung cancer may come through injections into the veins of a suspension of radioactive gold or radioactive zinc.

The radioactive gold and zinc particles in the suspension are about a thousand times larger than the colloidal size particles used in treatment of other forms of cancer.

As a result of this larger particle size, the radioactive gold or zinc is localized almost quantitatively in the lungs. The particles become little plugs, or emboli, in the capillary blood vessels of the lungs. Ordinarily, emboli plugging these small blood vessels are highly undesirable, but the radioactive ones have the advantage of theoretically being able to destroy cancer in the lung.

The method was reported to the Geneva conference by Dr. J. H. Muller of the University of Zurich, Switzerland.



HEAT BARRIER ASSAULT—Designed to exceed the record 1,650 miles an hour set by the Bell X-1A supersonic research airplane, the rocket-powered Bell X-2 is scheduled to begin flight tests soon at Edwards Air Force Base, Calif. Built particularly for heat barrier studies, the sweptwing plane is made of stainless steel to withstand aerodynamic heating and has many new design features.

By a small rubber tube that is fed through a vein up into the heart and out an artery into the lungs, the radioactive gold or zinc particles carried in dextran or pectin can be directed accurately into one lung only, Dr. Muller stated. The radioactive material can even be "shot into one particular lung lobe."

The method, now also under study in England, offers "quite interesting possibilities," Dr. Muller said, for treatment both of cancer starting in the lungs and of cancer that has spread to the lungs from other parts of the body.

Encouraging results in use of radioactive gold to treat another form of cancer, that of the ovaries, were reported by Dr. Muller in some detail.

For this treatment the gold is injected into the abdominal cavity. There, Dr. Muller has discovered, it is picked up by the body's scavenger cells and taken to lymph nodes, or glands as the layman would call them. Since these lymph nodes frequently are seeded with cancer cells spread from the original cancer, the localization of the radioactive gold in the lymph system is especially important.

Since 1950 Dr. Muller and Dr. E. Held have given this radioactive gold treatment prophylactically to 21 patients with cancer of the ovaries in whom a radical operation for removal of the cancer was possible. Two patients died of other conditions, but 18 are now alive and well and free from symptoms of ovarian cancer, some for as long as four and a half years. The cancer has not come back in a single patient in this group, Dr. Muller states.

In patients with advanced ovarian cancer and extensive spread, only palliation can be achieved. This has been accomplished in 59% of the patients, Dr. Muller reported.

Atoms Against Leprosy

► HOW MAN'S modern weapon, atomic energy, is being turned against a very ancient disease, leprosy or Hansen's disease, was reported to the conference.

A synthetic sulfone drug, known as DDS, extensively used and effective in over 80% of leprosy patients, has been tagged with radioactive sulfur, Drs. P. R. Saraiya, V. R. Khanolkar and A. R. Gopal-Ayengar of the Government of India's Department of Atomic Energy and Indian Cancer Research Centre, Bombay, announced.

The aim is to trace the drug's path through the body to see whether DDS shows any preference for nerve tissue. Studies by Dr. Khanolkar and associates had previously shown that Hansen's bacillus, the germ that causes the disease, seems to follow nerve fibers. The Indian scientists speculate on whether it is in this respect like neurotropic viruses, such as the polio virus.

The radiolabeled sulfone has been given by mouth to six patients and at various times afterwards bits of tissue have been removed from their bodies for study.

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VISION TESTED—Live rabbit is exposed to light source in studies of vision by Dr. Phil S. Shurrager, chairman of the department of psychology at Illinois Institute of Technology, Chicago. The investigations, sponsored by the Air Force, may result ultimately in a defense against blinding flares and explosions in warfare.

PHYSICS

Many Atomic Devices

► BY-PRODUCTS of atomic reactors, consisting of exploding atoms of many artificial chemical elements, are giving civilization new devices, including:

1. Lamps made of self-luminous phosphor materials, kicked into brilliance by electrons from polonium, tritium, strontium 90 and cesium 137 isotopes. These will shine without renewal and can be used to mark dangerous spots with a low-level illumination.

2. Batteries giving very small amounts of electricity over a long period of years without renewal. These radioisotope batteries convert radioactivity into feeble but usable current. Although they will not replace usual batteries, they are useful in electronics devices.

3. New chemicals produced by radiation smashing bonds between molecules in materials, changing them without introducing impurities. Plastics, synthetic rubbers and many other chemicals, including blood plasma extenders, are being remodeled by such radioactive polymerization.

4. Sterilization of food and drugs so that they will keep fresh for a long time. Radiation in large doses can destroy harmful bacteria and enzymes in material without significantly raising the temperature.

5. Measuring thickness of materials by finding out how radiation beamed through them is affected. Thickness gauges can oper-

ate upon substances in containers and can be applied to thick sections and ink-thin impressions on paper equally well. They are expected to be particularly important in automation processes.

6. Tracing where materials go by injecting a little of a radioactive substance. Successive shipments of petroleum products through cross-country pipelines can be marked precisely and switched automatically by changes in radioactivity.

7. Detecting leaks of gas or liquid, by spotting tell-tale tracer amounts of radioisotopes.

8. Determining wear and corrosion. When a material has been made radioactive, how much and how fast its surface wears down can be measured.

9. Labeling chemicals by introducing into their molecules radioactive tracer forms of their atoms. In this way new facts about chemical processes in industry, biology and medicine are being discovered.

10. Using radioactive materials to trace insects harmful to health and agriculture, to discover how plant foods are used in crops, and where and how such substances as insecticides do their work.

These uses of radioisotopes were explained to the Geneva conference on peaceful uses of the atom by Prof. P. C. Aebler of the U. S. Atomic Energy Commission.

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PSYCHOLOGY

70-Year-Old President

➤ **EVEN IF** President Eisenhower should decide not to run again, the chances are that within the next 25 years we will have at least one President beyond the age of 70.

This is the prediction of Dr. Harvey C. Lehman, psychologist of Ohio University, Athens, Ohio, who has spent many years studying the ages of leaders in various fields, and the ages at which creative thinkers have performed their most notable work.

Leaders, like the people they lead or represent, are older today than they were in the days gone by, Dr. Lehman told **SCIENCE SERVICE**.

Creative thinking in science, mathematics, art, music and literature occurs most frequently during the thirties, Dr. Lehman has found.

People holding elective office depend for their eminence, not alone on their own intelligence or creative competence, but on what people think of them. To be elected President of the United States, a person

must not only be able, but be known and liked by many voters.

Unless the United States experiences excessive political and social unrest during the years to come, Dr. Lehman said, the recent tendency to choose elderly leaders is likely to continue.

"Apparently," he said, "those who are satisfied with the status quo wish to play safe by choosing a leader with a long record and one whose future behavior they will be able to predict."

Even in the Army, where promotion depends not on votes but on the judgment of superiors, the highest ranking officers in time of war are becoming older. In the American Revolution and the War of 1812, top-ranking generals averaged under 40. Lafayette was a general at 20 and Kosciuszko at 30.

In the Civil War, highest ranking generals on both sides averaged just under 49. In World War II, top brass averaged just under 59.

Representatives in Congress averaged 20

years older in 1925 than they did in 1825, Dr. Lehman found. Senators in the same 100 years shifted upward 15 years.

Before 1875, only one man beyond the age of 65 was elected Speaker of the House. More than half were younger than 40 when elected.

However, between 1900 and 1940, the average age of Speakers was 67. This is 24 years older than the average age of those who held the office from 1789 to 1874.

The age of members of the President's cabinet has increased 14 years. From 1925 to 1945 the secretaries of state averaged 68.50 years of age.

If President Eisenhower should be re-elected in 1956, he would be 66 years old at the time of his inauguration. Only a little more than three months of his second term would be served after he passed his 70th birthday.

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PALEOBOTANY

"Fossil Chlorophyll" In Ancient Mud Deposits

➤ **"FOSSIL CHLOROPHYLL,"** buried in lake mud for thousands of years, can be recovered and measured to give clues to the past's plant life, Dr. J. R. Vallentyne of Queen's University, Kingston, Ontario, has found.

Analyzing lake bottom sediment, Dr. Valleryne discovered that degradation products of chlorophyll buried countless years ago are preserved in the cold, dark, oxygen-free mud. They can be isolated and measured to give a quick index of chlorophyll-bearing tissues in ancient mud.

Fossil chlorophyll was recovered from sediment that had been dated as 8,323 (plus or minus 400) years old by the radiocarbon method. In another pond, it was obtained from mud deposited about 11,000 years ago, Dr. Valleryne reported in the *Canadian Journal of Botany* (July).

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PHYSIOLOGY

Psychologist to Solve Why Setting Hen Sets

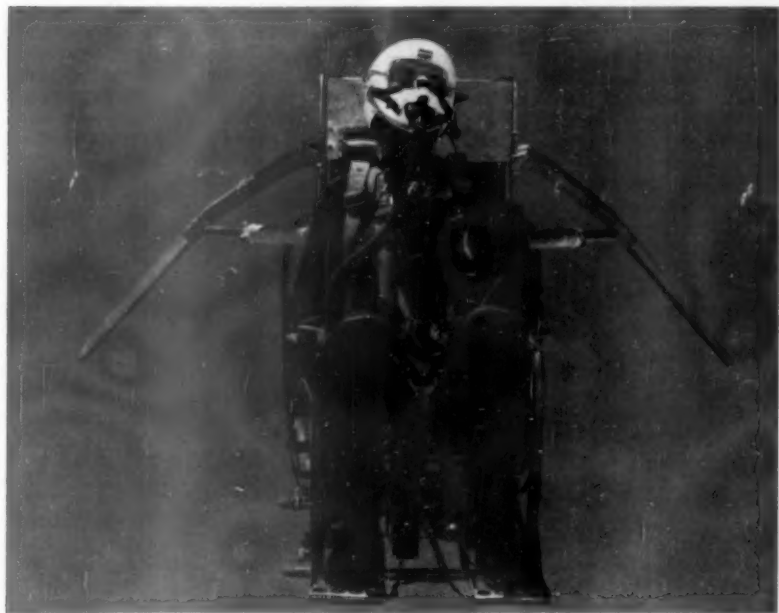
➤ A **PSYCHOLOGIST** has begun a two-year investigation to solve once and for all the old problem—why does a setting hen set.

Dr. Daniel S. Lehrman of Newark College of Arts and Sciences, the State University of New Jersey, will try to discover what hormones or other factors induce birds, both male and female in some species, to incubate their eggs with such tenacity.

Doing his work with doves, Dr. Lehrman is especially interested in the "brood patch," a tender, bald area strategically located where the birds do their sitting.

It may be that the tender area feels hot to the birds, due to the large blood supply, stimulating them to sit on eggs to have the spot cooled, he theorized.

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EJECTION SEAT—An improved method of emergency escape for pilots bailing out of supersonic aircraft has been developed for the Air Force by Douglas Aircraft Company. Principal element of the system, previously used only in research aircraft, is a downward ejection seat stabilized in an upright position by two fins. A pilot forced to abandon his plane at a high altitude would ride the seat down quickly to 15,000 feet, there be separated automatically from the seat to reach the ground by conventional parachute. For lower-altitude bail-outs, the pilot and chute are cleared from the seat within three seconds. Only one hand is needed to trigger the entire automatic sequence.

BIOCHEMISTRY

Old Men Grow Jovial From Hormone Treatment

► ELDERLY MEN improve physically and mentally from treatment with the synthetic male hormone, stanalone, studies at the National Heart Institute's laboratories in Baltimore, Md., show.

The benefits to body cell function were reflected by increased utilization of basic dietary ingredients of cell growth. The good effects were greater than those from improved diet alone.

The elderly men became more jovial and enthusiastic, and frequently volunteered statements about how well they felt.

The studies were conducted by Dr. Nathan Shock in collaboration with Dr. Donald M. Watkin, Miss Janis Parsons and Marvin J. Yiengst.

Advising against too much optimism as a result of the findings, Dr. Shock said, "This work should not be interpreted as endorsement for wide administration of such hormones. Much more research needs to be done in this and other research problems in aging. It is obvious that the ideal steroid hormone, for utilization in elderly people, is not yet available."

Stanalone, Dr. Shock also reported, produces certain undesirable side effects. It must be injected since it is not effective by mouth, and its use is sometimes followed by a painful reaction at the site of injection. It produces edema, a condition of "water-logged" tissues, in some individuals.

"These experiments have served to demonstrate that aged males retain the potentiality of responding to the anabolic (tissue-rebuilding) stimulus of the steroid hormone stanalone," Dr. Shock said.

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ARCHAEOLOGY

East German Communists Aid U. S. Scholar

► COMMUNISTS in East Germany are cooperating with an American scholar to aid in solution of a scientific super jigsaw puzzle, according to the University of Pennsylvania Museum.

Permission has been granted to Dr. Samuel Noah Kramer, the museum's cuneiform writing expert, to work in East Germany for "a couple of months" studying fragments of ancient Sumerian tablets.

Scientists have been working on the puzzle since fragments of thousands of ancient clay tablets were unearthed more than 50 years ago at Nippur, Iraq, by expeditions of the University Museum.

About 4,000 of the pieces are inscribed with Sumerian literary creations, the major remainder of the world's oldest literature. Practically all the tablets date from about 1700 B.C. Many are copies of works composed as long ago as 2000 B.C.

The Egyptians were creating literary works that long ago also, but they wrote

on papyrus, too perishable to survive.

Before scholars could read the text, the fragments of the tablets had to be fitted together. The cuneiform script of the ancient Sumerians also had to be deciphered. Dr. Kramer has devoted practically his entire scientific life to this painstaking work.

Most of the tablet fragments are located either in Philadelphia at the University Museum or in the Istanbul Museum in Turkey. But some of the pieces have been missing, a frustrating situation for a jigsaw puzzle worker. It is now known that these are at the Friedrich Schiller Universität at Jena, in East Germany.

By themselves, the pieces in Germany are useless. And without them, the tablets in Istanbul and Philadelphia cannot be completely read. Access to the missing "links" will enable Dr. Kramer to complete his study.

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BIOCHEMISTRY

Drug Helps in Parkinson's Disease

► A DRUG of the antihistamine class has helped almost half of a group of patients suffering with the Parkinson syndrome, best known to the layman as shaking palsy, two physicians report in the *British Medical Journal* (Aug. 6).

The drug is called B.S. 5930. Chemically it is beta-dimethylaminoethyl-2-methylbenzhydryl hydrochloride. It was made by chemical changes in antihistamines such as Benadryl. The changes reduced the antihistamine effect but increased the anti-acetylcholine effect.

Of 67 patients treated, 43 were helped, 31 of them getting more benefit than from any other previous treatment. The drug is called a "most useful addition" to present drugs for this condition, though not all patients will be helped by it.

Its value was determined by a special testing procedure. The trials and results are reported by Dr. R. O. Gillhespy of the Dudley Road Hospital, Birmingham, and Dr. A. Hall Ratcliffe of Manchester University, Manchester, England.

Science News Letter, August 20, 1955

FORESTRY

National Forests Yield Record Timber Harvest

► NATIONAL FORESTS of the United States yielded the greatest timber harvest on record in the year ending June 30, the U. S. Forest Service reported.

A total of 6,328,229,000 board feet, worth \$70,760,440, were cut on national forests, compared with 5,365,113,000 board feet in the previous year. Value of the current timber crop was more than \$5,000,000 above fiscal year 1954.

The Forest Service said a stepped-up road-building program opened up previously inaccessible timber stands.

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IN SCIENCE

MEDICINE

Develop Hospital Test for Polio

► A BLOOD TEST for polio that can be made quickly in any hospital or public health laboratory has been announced by Drs. Nathalie J. Schmidt and Edwin H. Lennette of the California State Department of Public Health laboratories, Berkeley, Calif.

More investigation and experience through practical application of the test are needed, the scientists state in their report to the *Journal of Experimental Medicine* (Aug. 1). But in each of 12 patients from whom polio virus was found in the stools, confirming the diagnosis, the new blood test showed both polio infection and the type of polio virus causing the disease.

The test is the kind known as a complement fixation test. It is essentially the same as one used in the Berkeley and other laboratories for routine diagnosis of many other virus diseases.

The California scientists developed it with the aim of creating a polio test that could be done with the same techniques and equipment used for other laboratory diagnostic tests. They think it will prove widely useful when more is known about its accuracy and reliability for diagnosing polio.

Science News Letter, August 20, 1955

BIOCHEMISTRY

Penicillin Product Has Effect on Growth

► ONE OR MORE products from the breakdown of penicillin, when it is no longer effective as an antibiotic, seem to stimulate growth in animals, report J. H. Taylor and W. S. Gordon of the British Agricultural Research Council in *Nature* (Aug. 13).

Penicillin's germ-killing power is not responsible for the boost in growth, they say.

Supplementing the feed ration with small doses of inactivated penicillin, given both by mouth and by injection, the scientists found that test pigs show essentially the same kind of growth benefits that whole, active penicillin gives.

Inactive penicillin gave an average growth rate increase of 9.4%, compared to 14.3% for active penicillin. This difference in effectiveness is not significant, the scientists say.

The ingredient in penicillin which causes the growth rate increase is probably an amino acid, penicillamine, a chemical that has already been shown to increase the growth rate of chicks.

Science News Letter, August 20, 1955

THE FIELDS

CHEMISTRY

Chance of New Fibers From Isotactic Chemicals

► A NEW SOURCE of possible fibers for textiles and rubber-like products is being developed by Dr. Giulio Natta of the Milan Polytechnic School, Italy.

The source is a class of chemical polymers not heretofore singled out for fiber production. Isotactic polymers is Dr. Natta's name for the class, which includes polypropylene and poly-alpha-butylene.

The special mark of isotactic compounds is presence at intervals along the chain-like molecule of atomic groups that give the compound characteristic optical and crystalline properties. The carbon atom to which these groups are attached is known as an "asymmetric" carbon atom.

Two types of polymers formed from isotactic compounds were described by Dr. Natta at the recent Fourth World Petroleum Congress in Rome. One, which is crystalline in structure, gives promise of forming fibers suitable for use in textile manufacture. The other, non-crystalline, type would be of a more rubber-like nature, according to Dr. Natta, and thus might increase the number of available synthetic rubbers.

Dr. Natta was among the official delegates from European countries to the 1951 meeting of the International Union of Pure and Applied Chemistry in New York who were excluded on account of passport difficulties because of the McCarran Immigration act.

Science News Letter, August 20, 1955

BIOPHYSICS

Harmful Plant Mutations Caused by Radiation

► HARMFUL MUTATIONS caused by irradiation exposure can prevent plants from manufacturing materials they need for life, an Australian geneticist, J. Langridge, reports in *Nature* (Aug. 6).

Practically all chlorophyll-bearing plants are able to synthesize all the organic materials they need for life from 14 simple elements, plus carbon dioxide and water, in the presence of sunlight.

Mr. Langridge found that exposure of the seeds of a small plant, *Arabidopsis thaliana*, to X-rays caused mutations in the hereditary setup that kept newly sprouted seedlings from converting the elements to needed materials.

One mutation kept seedlings from synthesizing thiamine, the base for vitamin B-1. The young plants had mottled seed leaves, and later the leaves had chlorophyll only at the tips. After a growth

lag, these plants were able to become green and grow again. Thiamine-deprived plants grew normally when chemical thiamine was fed to them.

Seedlings bearing another mutation showed early degeneration of the seed leaves and the plants died at the two-leaf stage. When supplied with nutrient-rich coconut milk, these plants began to grow slowly and eventually flowered.

Mutations of still another kind induced by X-rays prevented seedlings from developing chlorophyll. Feeding the sugar, sucrose, to the plants permitted them to grow and flower after a much longer interval than is normal.

Mr. Langridge, with the genetics department of the University of Adelaide, said that the biochemical mutations he discovered were probably only a few of those actually caused in the seeds, as many of the irradiated seeds could be expected to undergo mutations that would prevent them from sprouting.

Science News Letter, August 20, 1955

MEDICINE

See Safer Polio Vaccine From Virus Purification

► SAFER, MORE simply produced polio vaccine is foreseen as a result of a method of concentrating and purifying polio viruses announced in Philadelphia.

The method follows one developed for separating various components of blood plasma. Its adaptation to concentration and purification of all three types of polio virus was made by Drs. J. Smolens, A. Greene and L. Coriell of the Children's Hospital of Philadelphia and the University of Pennsylvania School of Medicine.

Essentially, the method consists in precipitation of polio virus from monkey kidney tissue culture medium by zinc lactate at the near freezing temperature of two degrees Centigrade. The precipitate, which contains more than 99% of the virus, is separated by spinning in the refrigerated angle centrifuge. Zinc is removed from the virus either by dialysis or by ion exchange resins.

Reporting the method in *Science* (Aug. 5), the Philadelphia scientists point out the following advantages:

"It provides a technique for safety testing of the finished vaccine, since any desired concentration may be effected.

"The process provides a simple way of removing various components of the medium, such as antibiotics, amino acids, and metabolites.

"It should simplify the production of the vaccine, since large volumes of virus may be conveniently and rapidly concentrated for processing and killing. This should make possible better standardization of virus inactivation with formaldehyde or other agents. With the removal of the growth medium, selection of a preservative and antigenic stability of the vaccine may no longer be a problem."

Science News Letter, August 20, 1955

MEDICINE

Mannequins on Tour for Atomic Medicine Study

► SEVEN HALF-BODY MANNEQUINS with artificial glands are touring the country to aid atomic medical studies, the medical division of the Oak Ridge Institute of Nuclear Studies has announced.

The mannequins are built to look as much as possible like the upper half of a human body. In their necks are artificial thyroid glands. These contain a mixture of radioactive barium and cesium. The mixture, called "mock iodine," substitutes for radioactive iodine which scientists use to test the health and functioning of the thyroid gland in patients.

This use of radioactive iodine has increased enormously during the past few years, but techniques used have differed widely. Consequently results have varied. It is with the hope of perfecting a uniform technique that will produce accurate results under all test conditions that the mannequins are making the rounds.

In New Orleans, Los Angeles, Boston, New York, Louisville, Ky., Madison, Wis., Little Rock, Ark., and at Oak Ridge, scientists will test the uptake of the mock iodine by the mannequin's thyroid. Each scientist will use his own technique. The results in each scientist's test of each mannequin will then be studied and compared. Between 300 and 400 test results are expected for study.

Science News Letter, August 20, 1955

ICHTHYOLOGY

Deadly Disease Kills 80% Of Young Brook Trout

► A DEADLY disease is killing up to 80% of the young brook trout in three West Virginia hatcheries, placing the state's hatchery program in danger, Dr. S. F. Snieszko of the Leetown Microbiological Laboratory, Kearneysville, W. Va., has reported.

The disease, unknown until last year, strikes at the pancreas of young brook trout, causing the infected fish to whirl violently as if they were literally "writhing in pain." It attacks only fingerlings.

Called infectious pancreatic necrosis, this new killer appeared first in January, 1954, at the Leetown Fish and Wildlife Service Station, W. Va.

By July, 1954, it had spread to hatcheries at Dorcas and Marlinton. While still taking its large toll of brook trout fingerlings in these hatcheries, it is not known to have moved into other areas, Dr. Snieszko said.

Cause of the disease is unknown, he said, although a virus is suspected. Investigations into the cause and prevention of the trout-killing malady are being made at the Leetown Laboratory.

Dr. Snieszko and his co-workers, Dr. E. M. Wood and W. T. Yasutake, describe the disease in the *Archives of Pathology* (July).

Science News Letter, August 20, 1955

GEOPHYSICS

Plan Antarctic Stations

Present plans for the International Geophysical Year, a world-wide look at the earth, its seas and air in 1957-58, include at least 45 stations in or near Antarctica.

By ANN EWING

➤ AT LEAST 45 stations will be operated by 12 nations on Antarctica or in sub-Antarctic waters during the International Geophysical Year, a world-wide probe of the earth we live on in 1957-58.

Their cooperative programs will mark the first time so many nations have combined efforts to learn the secrets locked in the White Continent. Part of an international look at the earth, its seas and air, the plans for the Antarctic expeditions were made recently in Paris by delegates from the 12 countries.

Members of the expeditionary forces are expected to raise Antarctica's population at least 10 times, from its present 80 to no less than 800, not including Emperor penguins.

Of the 45 "down under" stations now planned, 26 will be on the continent itself, nearly three times as many as were expected when Antarctic plans for the International Geophysical Year were made in 1954 at Rome.

Five new nations, Belgium, Chile, Japan, the Union of South Africa and the USSR, announced at the Paris meeting their intentions of setting up Antarctic bases for coordinated scientific observations during 1957-58.

The United States will operate three of the new bases, bringing to six its total number of stations on the White Continent. These will be located at the new Little America, the South Pole, McMurdo Sound, Vahsel Bay, Knox Coast and in Marie Byrd Land.

Russian Bases

Russia revealed that her scientists, for the first time, will man two, and perhaps three, bases on the continent.

One is planned for the Knox Coast at 104 degrees east longitude, another several hundred miles inland on the same meridian. The third possible station would be another 200 or 300 miles farther inland and to the west of the second, the Russian delegate suggested at the Paris Antarctic Conference.

The seven nations that previously agreed to operate existing or new stations on Antarctica during 1957-58 are Argentina, Australia, France, Great Britain, New Zealand, Norway and the United States.

At least 40 countries are now coordinating their research efforts for the International Geophysical Year, or IGY, to improve our knowledge of this planet.

Dr. L. M. Gould, president of Carleton College and chairman of the Antarctic Committee of the U. S. National Committee for IGY, called the Paris meeting "historical."

"Never before," he said, "have nations cooperated on such a large-scale enterprise. Previous expeditions to the Antarctic have largely been by individual nations working alone. The international, cooperative plans now being made insure the gathering of much more information than if each nation were acting independently."

One example of the "unprecedented" international cooperation is acceptance by the U. S. of responsibility for handling weather information for all nations. For the first time, daily weather maps will be issued for the Antarctic regions. Representatives

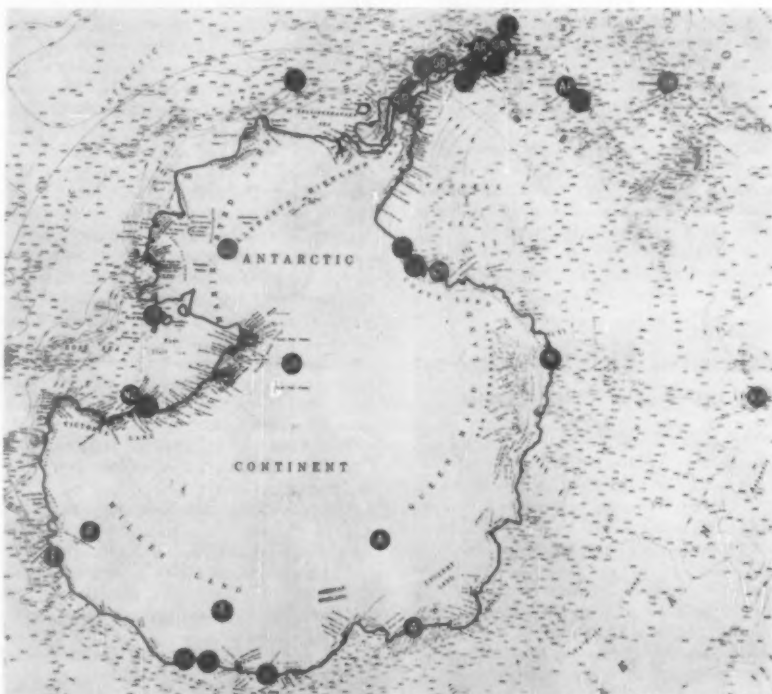
at the Paris meeting agreed that all stations in the Antarctic and in sub-Antarctic waters, as well as field parties, would regularly radio their local weather conditions to the central facility, which will be located at the new Little America.

There, all reports will be consolidated and, based on this overall picture, weathermen will make forecasts for the individual areas. Their predictions will be broadcast daily to the other stations.

The frequencies to use for weather forecasts and other required radio communications are being worked out by an international committee, each country designating one person to the working group. Radio facilities will be divided into mother, daughter and relay stations.

Prediction of the best usable frequencies for radio communications six months or a year in advance will be made by Australian scientists. U. S. radio experts will make the short-term forecasts.

Next November, in "Operation Deepfreeze," the U. S. is sending two icebreak-



ANTARCTIC STATIONS PLANNED—This map shows the location of 26 proposed bases to be established on Antarctica during the International Geophysical Year during 1957-58, as well as a few of the stations planned for sub-Antarctic waters. Ar stands for Argentina, A for Australia, B for Belgium, C for Chile, F for France, GB for Great Britain, J for Japan, NZ for New Zealand, N for Norway, SA for South Africa, R for Union of Soviet Socialist Republics, and US for United States.

ers, two or three freighters and a tanker to the Ross Sea, taking advantage of the Antarctic summer of 1955-56 to establish the new Little America near Kainan Bay.

Another icebreaker will explore the Vahsel Bay area.

Aircraft will make reconnaissance flights over Byrd Land and the South Pole, laying ground for airlifting supplies to field forces during 1957-58.

Weddell Sea

Other bases announced at the Paris meeting include:

Argentina, on the Weddell Sea, at 78 degrees south, 37 degrees west.

Chile, two stations on the Palmer Peninsula; two on the South Shetland Islands and two in southern Chile. These are all existing bases that will have increased staffs for International Geophysical Year observations.

Belgium, on the Queen Mary Coast at 95 degrees east.

Japan plans to set up a summer station on Peter I island.

Although most of the 45 stations are widely scattered, two sets of three each are relatively close together, one group on the Knox Coast, which is almost directly south of Australia, and the other on the Vahsel Bay, which lies south of Argentina. Belgium, Russia and the U. S. will operate the Knox Coast bases, all within 500 miles of each other. In the Vahsel Bay area, Argentina, Great Britain and the U. S. will have stations within 200-300 miles of each other.

Purposely Close

The close proximity of the two groupings will allow scientists to make a much needed, detailed study of the two regions, something never before attempted in Antarctic exploration. Research programs at these stations will be coordinated.

The U. S. scientific program for IGY is under the direction of the National Academy of Sciences, with Dr. Gould as chairman of the Antarctic Committee Logistic and expeditionary forces will be directed by the Navy for the U. S. National Committee for IGY. Rear Adm. Richard E. Byrd is in overall charge of these operations, and Rear Adm. George E. Dufek is field commander.

Dr. Georges Laclavere, Secretary-General of the International Union of Geodesy and Geophysics, called the Paris Antarctic Conference and was subsequently elected its chairman.

In addition to the 45 permanent stations, at least four lengthy overland expeditions are planned, one of which will cross the continent. The British and French now expect to send one each, and the U. S. expects to send two.

Science News Letter, August 20, 1955

All agricultural areas of California are now being surveyed to determine the extent of plant damage from air pollution.

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THE ABOMINABLE SNOWMAN—Ralph Izzard—*Doubleday*, 250 p., illus., \$4.00. A London newspaperman reports an expedition sent out by the London Daily Mail to track down this legendary beast. The party returned without encountering the animal, but convinced it does exist.

ADVANCES IN EXPERIMENTAL CARIES RESEARCH—Reidar F. Sognnaes, Ed.—*American Association for the Advancement of Science*, 236 p., illus., \$6.75. Based on a symposium, this book presents information gained from research on the experimental production and prevention of tooth decay in laboratory animals.

ANTIMETOBOLITES AND CANCER—Cornelius P. Rhoads, Ed.—*American Association for the Advancement of Science*, 312 p., illus., \$5.75. A symposium presented at the Boston meeting of the AAAS, December 28-29, 1953.

BIRD HOUSES, BATHS AND FEEDING SHELTERS: How To Make and Where to Place Them—Edmund J. Sawyer—*Cranbrook Institute of Science*, Bulletin No. 1, 5th ed., 36 p., illus., paper, 50 cents.

CAPTAIN COOK AND THE SOUTH PACIFIC: The Voyage of the "Endeavour", 1768-1771—John Gwyther—*Houghton Mifflin*, 268 p., illus., \$3.50. The author has drawn heavily from the lively and detailed journal kept by Captain Cook during this voyage.

CATALYSIS: Vol. III, Hydrogenation and Dehydrogenation—Paul H. Emmett, Ed.—*Reinhold*, 504 p., illus., \$12.00. Emphasizing the factual data on catalytic hydrogenation and the principle ideas as to the mechanisms involved.

THE COMMONWEALTH AND NUCLEAR DEVELOPMENT—Reference Division—Central Office of Information (British Information Services), 52 p., paper, free upon request to distributor, 30 Rockefeller Plaza, New York 20, N. Y. Surveys briefly the story of atomic energy and the British contribution to that story as well as describing progress in other Commonwealth countries.

DANGER MY ALLY—F. A. Mitchell-Hedges—*Little, Brown*, 278 p., illus., \$3.75. A modern story of adventure and exploration.

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DETERMINATION OF ORGANIC STRUCTURES BY PHYSICAL METHODS—E. A. Braude and F. C. Nachod, Eds.—*Academic*, 810 p., illus., \$15.00. Dealing with physical methods of determining structure of organic compounds, from the functional point of view.

ELECTRONIC DATA PROCESSING IN INDUSTRY: A Case Book of Management Experience—Don G. Mitchell and others—*American Management Association*, Special Report, No. 3, 257 p., illus., \$7.75. Describing how automatic data-processing offers unparalleled speed, accuracy, controls and saving for industry, giving specific, practical information on the adaptation of these systems to industry.

GEOLOGY OF THE OTTER RIVER AREA, BEDFORD COUNTY, VIRGINIA—William E. Diggs—*Virginia Polytechnic Institute*, Engineering Experiment Station Series No. 101, 23 p., illus., paper, 25 cents. Describing the various rock types in this area of southern Virginia.

LECTURES ON FUNCTIONS OF A COMPLEX VARIABLE—Wilfred Kaplan with the assistance of Maxwell O. Reade and Gail S. Young, Eds.—*University of Michigan Press*, 435 p., \$10.00. The objective is to promote the interaction between topology and analysis. The proceedings of a conference.

LECTURES ON THE SCIENTIFIC BASIS OF MEDICINE, Vol. III, 1953-1954—British Postgraduate Medical Federation—*University of London (John de Graff)*, 398 p., illus., \$6.00. Assisting medical men to appreciate advances being made in areas other than their own specialized field.

THE LUMINESCENCE OF BIOLOGICAL SYSTEMS—Frank H. Johnson, Ed.—*American Association for the Advancement of Science*, 452 p., illus., \$7.00. Including all aspects of bioluminescence, together with fundamental aspects of chemiluminescence and fluorescence.

MORBIDITY FROM CANCER IN THE UNITED STATES: Part I, Variation in Incidence By Age, Sex, Race, Marital Status, and Geographic Region—Harold F. Dorn and Sidney J. Cutler—*Govt Printing Office*, Public Health Monograph No. 29, 121 p., illus., paper, 65 cents. Analyzing the findings of a series of studies made in ten metropolitan areas.

PICTURE BOOK OF TV TROUBLES: Vol. 4, Automatic Gain Control (AGC) Circuits—John F. Rider Laboratories Staff—*Rider*, 84 p., illus., paper, \$1.80.

PRINCIPLES OF NUCLEAR REACTOR ENGINEERING—Samuel Glasstone—*Van Nostrand*, 861 p., illus., \$7.95. Sponsored by the Atomic Energy Commission to aid in the training of nuclear engineers, this test is based on experience in the Commission's laboratories and material in their files.

PRODUCTION OF HEAVY WATER—George M. Murphy and others, Eds.—*McGraw-Hill*, 394 p., illus., \$5.25. The research and development of large-scale production of water with the heavy hydrogen isotope known as deuterium, necessary in one of the important methods of D235 production.

SALAMANDERS AND OTHER WONDERS: Still More Adventures of a Romantic Naturalist—Willy Ley—*Viking*, 293 p., illus., \$3.95. Exploring some of the odd secrets of zoology and weird botanical lore, such as the "Abominable

Snowman," the mysterious creature of the Himalayas.

SCIENTIFIC AND TECHNICAL SOCIETIES OF THE UNITED STATES AND CANADA: Part I, Scientific and Technical Societies of the United States—Library NAS—NRC, Part II, Scientific and Technical Societies of Canada—John R. Kohr—*National Academy of Sciences-National Research Council*, 6th ed., 447 p., \$7.50. This directory includes information about purpose, officers and publications of scientific organizations.

SIGNS OF THE HEALTH TIMES: The 1955 National Health Forum on Forecasting America's Health—Hugh R. Leavell, president, *National Health Council*, 64 p., illus., paper, \$1.00. One session is devoted to the role of "mass communications media" in health betterment.

SOLAR ENERGY RESEARCH—Farrington Daniels and John A. Duffie, Eds.—*University of Wisconsin Press*, 290 p., illus., \$4.00. If a tiny fraction of the effort which has been given to atomic energy were to be invested in research on solar energy, the progress would be rewarding. This book is intended to arouse interest in this field.

THE STORY OF MEDICINE—Kenneth Walker—*Oxford University Press*, 343 p., illus., \$6.00. Telling the story of medicine from prehistoric times to the present era of scientific medicine.

TRAVEL AND TRANSPORT THROUGH THE AGES—Norman E. Lee—*Cambridge University Press*, 2 ed., 187 p., illus., \$2.50. Describing, for young readers and their elders, man's efforts through the ages to find a faster, more efficient means of transportation.

VEHICLE OPERATION AS AFFECTED BY TRAFFIC CONTROL AND HIGHWAY TYPE—Carl C. Saal and others—*Highway Research Board*, Bulletin 107, 62 p., illus., paper, 90 cents. Containing three papers presented at the Annual Meeting of the Highway Research Board, January 1955.

WORDS FOR WORK: Handbook of Trade Terms for a Tutoring Program for New Americans—S. Norman Feingold, Ed.—*Jewish Vocational Service of Greater Boston*, revised ed., 140 p., paper, \$1.00. English-German equivalent of terms used in various occupations as gathered from the Government's "Dictionary of Occupational Titles," and counselors working in voluntary commercial and government agencies. Intended to help new Americans to get good jobs.

Science News Letter, August 20, 1955

TECHNOLOGY

No-Scouring Pots and Pans

► SCRUBBING and scouring pots and pans may be a thing of the past. A technique has been developed that makes cooking utensils "food-sticking proof," Frank E. Hammond, president of the Selinized Process Company, Omaha, Nebr., has announced.

The process called "Selinization" prevents food from sticking to metal. Foods can be fried, baked, boiled or broiled without adhering to the treated metal.

Discoloring or corroding of pots and pans is also eliminated, Mr. Hammond reported. "Selinization" is named after a father and son research team, S. A. Seline and S. A. Seline, Jr., who are responsible for the metals treatment development.

Utensils treated with the stick-proof process will be available to the public by 1956.

Science News Letter, August 20, 1955

TECHNOLOGY

No Cheating Pay TV

► **EVEN AN EXPERT** puzzle-solver will find it almost impossible to beat the controversial "pay-as-you-watch" television system, if and when the Federal Communications Commission permits operation.

The Zenith Radio Corporation, which developed one subscription TV system called "Phonevision," employed expert cryptographers and engineers to make it hard for the viewer to cheat.

Special programs would be sent over the regular TV channels in the system, but only those who pay to find out the code number, different for every program and every set, will be able to enjoy the show. Others would see a garbled picture. The viewer could tell he is missing a Western, but the picture and sound would be not only unintelligible but unpleasant.

99,999 Possibilities

The crudest code-beating technique is to try all the combinations until a clear picture is received. There are, however, 99,999 possible code numbers for each program, enough to discourage even the hardest.

The more enlightened puzzle fan might join with his neighbor who also likes problems to work out the relationship between

the code numbers for the two sets. When the problem is solved, only one would have to pay to learn the code number for both. This is possible, but it would take a long time, according to the system's designers.

No information about the code number can be obtained from a garbled picture, and every wrong combination produces a picture just about as bad as any other.

Here is how the system works:

The picture on a receiving set is actually many individual frames following in quick succession. In between each frame, the system sends a ten-impulse code that sets your decoder for unscrambling the next frame. The scrambling is done by displacing 16-line sections of the picture horizontally in a random order. Thirty-two different scrambling variations are used.

The broadcast signal for Phonevision, although almost exactly like the regular signal, requires special equipment that will panel a large wall.

The garbled picture looks somewhat like a checkerboard with the boxes moving up, down and sideways. Viewers would find the code number for each desired program from a punchboard card, which would also be used for billing.

Science News Letter, August 20, 1955

ICHTHYOLOGY

Eel's Appearance Puzzles

► **SCIENTISTS WERE** puzzled by the appearance of thousands of eels at the landlocked mouth of Lake Coila in southern New South Wales. Eel heads protruded above the water like a forest of blackened twigs.

The sea was calm and a big stretch of sand separated lake and eels from the ocean.

The eels, up to five feet in length and some weighing 30 pounds, began to churn back and forth across the waters of the lake, which is near the mouth of the Tuross river, 13 miles from Moruya. Within three days a storm lashed the coast, bringing waves across the beach, over the low-lying sandhills and into the mouth of Lake Coila.

Then a squiggling, squirming mass of eels made an exodus into the sea. When the waves receded, hundreds were left stranded on the sandhills between the lake and the sea.

Harold Phippin, a local resident, said that it was a "fantastic sight" to see a lake about seven miles around full of eels.

The experts do not know what instinct brought the eels to the lake nor why it is that eels seem to carry built-in tide and storm predictors. They agree that the Lake Coila eels were off to their traditional breeding grounds at sea at an unknown site.

Australian Museum ichthyologist Gilbert Whitley said the breeding ground "is prob-

ably off New Caledonia," about 1,000 miles northeast of Australia.

He said that the females, fattening up in the fresh water streams, pick up the males from around the estuaries and head back to the breeding ground about every 13 years.

In the deep of the breeding ground, the eels develop large eyes. They lay an egg that floats to the surface, where the elver begins growing. The elvers then work their way back to the Australian coast.

Science News Letter, August 20, 1955

MEDICINE

Blood Test Shows Extent Of Heart Muscle Damage

► **A BLOOD TEST** for the extent of heart muscle damage in heart attack victims is now ready for use by practicing physicians, the National Heart Institute, Department of Health, Education and Welfare, has announced.

Need for expensive research laboratory equipment has been eliminated in the simplified version of the test developed and evaluated by Dr. Daniel Steinberg of the National Heart Institute, Bethesda, Md., and Dr. Bernard Ostrow of George Washington University, Washington.

The test determines the amount of an

enzyme, transaminase, in the blood when bits of heart muscle have died as a result of clogging of an artery supplying these parts of the heart with blood. The test was first developed by scientists at Sloan-Kettering Institute in New York (see SNL, June 18, p. 389).

The test does not replace the electrocardiograph now widely used to determine heart damage. Instead, it is expected to supplement this, giving more precise information about the extent of permanent heart damage and consequent chances for recovery of the patient.

Details of the modified test are reported in the *Proceedings of the Society for Experimental Biology and Medicine*.

Science News Letter, August 20, 1955

BIOCHEMISTRY

Hydrogen Balance May Be Clue to Epilepsy

► **THE DELICATE BALANCE** between charged hydrogen atoms in the blood and those in the brain fluid may be related to epileptic seizures and other brain disorders.

This has been suggested in research by Dr. Robert Tschirgi and associates of the Medical Center on the Los Angeles campus of the University of California.

Studies performed under a U. S. Public Health Service grant have shown that a slight change in the ratio of hydrogen ions in the blood and those in brain fluid will change the electrical potential between the two fluids. Such changes can be measured by inserting tiny electrodes in the brain and in the vessels that serve the brain.

There is a barrier between the blood vessel and the moat of fluid that surrounds brain cells. These hydrogen ions apparently cannot pass through the barrier on their own. In the barrier, however, may be tiny pumps that can force the ions through the barrier when necessary.

Dr. Tschirgi's studies have suggested that when these pumps break down, the delicate balance of the hydrogen atoms between the blood and brain is upset. This may initiate epileptic seizures and other brain disorders, he suspects.

Science News Letter, August 20, 1955

One cave in the Lava Beds National Monument contains a frozen waterfall and a river of ice that never melts.

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PSYCHOLOGY

Adolescence Is Period of Confidence and Optimism

► TODAY'S ADOLESCENTS, popularly characterized as anxious and tense, look to the future with confidence and high optimism, a recent study indicates.

Modern youths seem to be facing the same religious, social and physical problems their fathers and mothers faced, according to Dr. Warren R. Baller, University of Nebraska psychologist serving on the summer faculty of the University of California at Los Angeles.

Dr. Baller was consultant to a recent nationwide HI-Y (youth groups of the YMCA) study in which several thousand teenagers were interviewed. The responses revealed little evidence that world conditions were adding any additional stresses to the "growing up" period.

"Instead," Dr. Baller said, "early results show adolescence to be a period of confidence and high optimism. You might say today's young people are keyed up but not afraid."

The Nebraska scientist said youth today is preoccupied with much the same problems young people have always faced. Their goals can be summarized as:

1. Satisfactory dependence-independence relationship with parents and other adults.
2. Satisfactory concept of civic responsibility.
3. Satisfactory religious philosophy.
4. Satisfactory adjustment to persons of the opposite sex, including preparation for marriage.
5. Better understanding of physical growth.
6. Winning and holding of friends.

"A lot of what we used to label as tension and anxiety in teenagers is just plain noise," he added.

Science News Letter, August 20, 1955

TECHNOLOGY

1956 Cars Will Have Safety Door Latches

► INTERLOCKING DOOR LATCHES, which have held car doors closed when the car crashed head-on at 40 miles per hour, will be featured on 1956 Studebakers.

The company has experimented with the door latches for four years. Many serious traffic injuries and fatalities, scientists have reported, could have been avoided if the door latches had held and thus kept occupants from being thrown from their cars.

In the recent public tests, four 150-pound "dummies," two wearing safety belts and two rigged to throw their entire weight on the doors, rode in a four-door sedan that crashed at 40 miles per hour into a concrete barrier. The front end of the car was badly demolished, but the dummies were still in the car, and the car's doors could be easily opened and closed.

Science News Letter, August 20, 1955



The Ragweeds

► THE BOTANIST who gave the ragweeds their scientific name must not have suspected the villainous role they play in causing hay fever, or else he must have had an unusual sense of humor.

For he lumped the ragweeds into a group which he called "Ambrosia," a Greek word for "food of the gods," which bestows immortality on the eater. Perhaps he was thinking of the seeming immortality of sneezing and aches that grip hay fever sufferers in August and September when ragweeds are in full flower.

Growing in masses of hundreds or thousands together, ragweeds develop greenish-yellow flower spikes about the middle of August. Each of these spikes produce tremendous quantities of pollen—the male element which fertilizes the seed.

The pollen grains are tiny, light and buoyant, and the wind can scatter them for great distances. This is fine for the ragweeds, as it insures fertilization over a wide area. But for the millions of people who are allergic to ragweed pollen—a primary cause of hay fever in late summer—it seems like a diabolical invention.

Nearly 60 species of ragweeds are known to scientists, and about 15 of them are found in the United States. Happily, only five of these are important in hay fever, although these cause trouble enough.

Over most of the eastern section of the country, the common, or dwarf, ragweed *Ambrosia elatior*, and the giant ragweed, *A. trifida*, hold sway. As these become scarcer in the West, they are replaced by two similar plants, the western ragweed, *A. pilostachya* and the giant western ragweed *A. aptera*. The lance-leaved ragweed causes trouble in the central states.

As if these are not enough, there are about 25 species of "false ragweeds," *Franeria*, that compete with ragweeds in spreading pollen in the United States. These can be distinguished from true ragweeds only by such technical details as their more spiny seed pods.

Science News Letter, August 20, 1955

VETERINARY MEDICINE

Race Horses' Hearts Provide Clue to Winners

► TIP SHEETS may feature an electrocardiogram of the long-shot horse's heart before long.

J. D. Steel, veterinary scientist at Sydney University, Sydney, Australia, has found a scientific way to estimate a race horse's potential performance, based on studies of hearts. He uses an electrocardiograph to determine the race horse's heart capacity and to check for normal or abnormal function.

If the horse has a certain heart capacity along with other observable qualities, you can bet he will win a certain amount of money, according to Mr. Steel's findings.

For his experiments, Mr. Steel tested about 200 racing horses, including 50 trotters, at the Randwick racing stables of five top trainers.

He classified the horses into five grades on the basis of electrocardiograph results. Those in the first four grades had normal hearts. Horses with the largest heart capacities rated grade one, and decreasing capacities fell in grades from two to five.

He found that outstanding race horses generally ranked in the first two grades.

Grade five animals have difficulty winning because of their heart defects. Grade four horses would have a hard time, but they might win in weak company. Grade three horses could win occasional races on metropolitan tracks.

Mr. Steel said that some good performers in grade two developed heart abnormalities after racing for some time and dropped to the lowest level. A surprising number of racing horses have slight cardiac abnormalities, he said.

Science News Letter, August 20, 1955

Questions

ARCHAEOLOGY—How are East German Communists helping a U. S. scholar? p. 120.

□ □ □

FORESTRY—What was the timber yield from national forests last year? p. 120.

□ □ □

GEOPHYSICS—What is the International Geographical Year? p. 122.

□ □ □

PSYCHOLOGY—Why should a 70-year-old President be expected within 25 years? p. 119.

□ □ □

TECHNOLOGY — What is "Selinization"? p. 124.

□ □ □

Photographs: Cover, Union Carbide and Carbon Corporation; p. 115, Argonne National Laboratory; p. 117, Bell Aircraft Corporation; p. 118, Illinois Institute of Technology; p. 119, Douglas Aircraft Co., Inc.; p. 122, Fremont Davis — U. S. National Committee for the International Geophysical Year; p. 128, Dallas Engineers, Inc.

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❁ **ALL-BLACK CAMERA** is designed for photographers who want to make candid shots without being conspicuous. The finish, which deadens reflection, is treated to resist mildew, fungus and various climatic conditions. Originally requisitioned by members of a magazine's photo staff, the camera will be sold on special order only.

Science News Letter, August 20, 1955

❁ **TUBE TESTER** is a portable gadget for the "do-it-yourself" fan who wants to test radio and TV tubes, including the TV set's main picture tube. Place a tube in the tester's socket and if the pilot bulb does not light, the tube filament is bad and the tube should be replaced. The tester, made of aluminum, uses current from built-in pocket flashlight batteries.

Science News Letter, August 20, 1955

❁ **TARGET RIFLE**, 22 caliber, is the first production rifle to have a built-in bedding device, a feature that permits changing the pressure between barrel and stock fore-end. Partially designed by small bore rifle experts, the rifle's trigger movement and pull are easily adjusted. Ammunition for the rifle has a new rim shape for improved ignition, and was designed for better wind-bucking qualities.

Science News Letter, August 20, 1955



❁ **PONTOON BOAT** looks like a water-skimmer, those long-legged insects with a talent for skimming over the surface of still water. It is shown in the photograph. The boat's passengers are carried high above the water on a bench attached to two glass fiber pontoons. The boat is driven by passenger pedal-power, an outboard motor or an airplane-type engine.

Science News Letter, August 20, 1955

❁ **RELIEF MAPS** of the world's continents are shaped to the curvature of the earth to prevent distortions inherent in flat maps. Made of plastic with mountains and rivers standing out in relief, the circular maps resemble a slice from the globe.

Science News Letter, August 20, 1955

❁ **NEW TRAILER**, for carrying boats, small vehicles, equipment or materials, lowers flush with the ground to make loading or unloading easier. The elevator feature operates hydraulically, standard models having welded-steel bodies six feet wide and 10 to 14 feet long.

Science News Letter, August 20, 1955

❁ **HAND CREAM** for protecting the skin from harsh chemicals in detergents, bleaches, photo developing solutions, and similar products forms an invisible barrier around the skin. It has been reported so effective that demonstrators have immersed their treated hands in concentrated hydrochloric acid without damage to the skin.

Science News Letter, August 20, 1955

❁ **POCKET-SIZE INSTRUMENTS** can do the work of an engineer's transit in all preliminary and reconnaissance work. The compass and clinometer are designed to replace pentagonal prisms, angle glasses, the Abney level and the hand level. Object sighting and scale reading are simultaneous operations.

Science News Letter, August 20, 1955

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8-20-5

Do You Know?

An average thunderstorm releases 50 times the energy of the first atomic bomb.

The first commercial international flight was made between Paris and London on Feb. 8, 1919.

Chestnut breeding to develop blight-resistance has now produced varieties that may be considered as an orchard crop and as a source of game food in the woods.

Three hundred gallons of jet fuel are required to taxi a current jet bomber from warm-up ramps to the end of a runway for take-off, generally a distance of about one and a half miles.

Titanium is melted to ingots under a blanket of helium that keeps the metal from absorbing harmful gases while hot; many metals are welded under a helium shield for the same reason.